

Australian bushfire inquiry examines the terrible impact of smoke inhalation

John Mackay
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The federal government's Royal Commission into National Natural Disaster Arrangements began its hearings last week into the unprecedented and devastating 2019–2020 Australian bushfires. The fires were responsible for 33 deaths, the destruction of at least 3,000 homes, 7,000 outbuildings, the burning of more than 12 million hectares of land and the death of more than one billion native animals.

Initial presentations focused on climate change, as well as the wildlife and health impact of the fires. The commission will continue this week with the final report due in August, the beginning of the next bushfire season.

A study published in the *Medical Journal of Australia* (MJA) in March and presented to the commission analysed the death rates in the regions impacted by the bushfires. It demonstrated there was a significant increase in deaths and hospital admissions in areas affected by high levels of bushfire smoke. It estimated that the number of deaths was more than ten times the number killed directly by the bushfires.

The data presented by Associate Professor Dr Fay Johnston from the University of Tasmania, the author of the study, revealed bushfire smoke was responsible for an estimated increase of 445 premature deaths. There was also an increase of 3,340 hospitalisations due to heart and lung conditions, while a further 1,373 presented to emergency departments due to asthma.

The poorest air quality from the bushfires was predominately in south eastern regions of Australia where millions were exposed to record fine particulate levels for many weeks. At this time, many of the major cities and surrounding regions recorded levels of air pollution higher than the top polluted cities in the world, such as Delhi in India, Lahore in Pakistan and Shenyang in China.

For days and weeks on end, the cities of Sydney, Melbourne, Brisbane, as well as smaller regional towns and cities such as Canberra, experienced air pollution

levels up to 26 times above levels considered hazardous to human health. A pollution index value of 5,185 was reached on the highest day in Canberra—a rating of 200 is considered hazardous to health. The authors of the MJA study using data on existing death rates and hospital admissions were able to estimate the numbers of excess deaths, hospitalisations for cardiovascular and respiratory problems, and emergency department presentations with asthma in the Australian states that were directly impacted by bushfire smoke exposure.

These were New South Wales (NSW), Queensland (Qld) and Victoria (Vic) and the Australian Capital Territory (ACT) over the spring and summer months from October 2019 to February 2020. This equated to 19 weeks of continuous fire activity.

Dr Johnston told the *Guardian* in March that this type of study was important, as it was “the only way to get a quick ball park idea of the health impacts.” To understand other aspects of the detrimental health effects of air pollution can take many years for the data to be collected and the impact assessed and published.

“The fires were unprecedented in Australia's history, in terms of vast amounts of smoke, the huge populations affected by the smoke and the long duration,” she told the *Guardian*. Sydney, Australia's largest city, experienced 81 days of poor or hazardous air quality in 2019, more than the total number days in the previous 10 years. Johnson said that 80 percent of Australia's population was exposed to the bushfire smoke.

Many of those who had died would have likely been older patients with pre-existing heart or lung disease. However, asthma does not discriminate on the basis of age and it is likely many of the premature deaths could have involved younger people.

The bushfire smoke presented a significant public health threat. It is well known that it contains fine particulates small enough to be inhaled that can then be deposited in

the airways of the lungs and absorbed into the bloodstream.

These particles are known to have negative cardiovascular effects leading to cardiovascular disease, or can exacerbate established cardiovascular disease, as well as causing or exacerbating other medical conditions. The study's findings are likely to be conservative estimates. As one of its co-authors, Professor Bin Jalaudin from the University of New South Wales, stated: "We only looked at four states for a defined period from the first of October 2019. There were some fires in September which we did not take into account and also those in other states."

"Secondly, we only looked at the outcomes where we have strong evidence. There are many other health effects caused by bushfires, for example mental health effects, hospital admissions or ED visits for other conditions which we did not evaluate—either because it is difficult to obtain such information, or because the links between air pollution and these conditions are not as strong.

The study was not able to account for the full impact of the fires and smoke on people on the frontline, including firefighters and the communities directly affected. Those with burns, acute smoke inhalation and other injuries may not have attended hospital at this time and thus may not have been included in the data analysed.

Studies of bushfires as well as the burning of agricultural land have found links to increases in cardiovascular mortality, the risk of developing cardiovascular disease and heart attacks.

In 2014, the journal *Environmental Health* demonstrated by looking at 46 days between 1996–2007 affected by bushfire smoke that there were increases in hospital emergency department attendances for respiratory and cardiac disease. It found the increase persisted up to three days after each event. An earlier study by the same group in the journal *Environmental Research* in 2011 found a 5 percent increase in non-accidental mortality in examining 48 days of fire smoke.

Other studies internationally point to longer term health issues. In children, the link between smoke exposure and declines in lung function in non-asthmatic children has been established as well as increased visits for respiratory problems. In those with known lung disease, the need for increased medication use following bushfires has also been established.

Other studies suggest smoke exposure can impact birth outcomes. One study published in 2012 in the journal *Environmental Research* investigating birth outcomes

after the 2003 California wildfires found lower birth weights in babies born after fire. Low birth weight is implicated with a variety of negative health outcomes later in life that can include respiratory and cardiovascular disease, as well as cancer and psychiatric problems.

Climate change has resulted in an increased frequency of fires. Measurements of global surface temperatures have found 17 of the 18 warmest years from 1880–2017 have all occurred since 2001, with the exception of 1998. A study published as far back as 2006 in the prestigious journal *Science* found strong correlations between increased wildfire activity on the US West Coast and climate change.

The study found the number of wildfires from 1987 to 2003 was almost four times the average of 1970 to 1986. The total area burned by these fires was more than six times higher. The study also noted that the fire season was longer, increasing by 78 days—a 64 percent jump compared to the earlier period between 1970–1986.

The scientific community has been warning for years of the potential impact of climate change with the increased likelihood of warmer temperatures and drought. There were ample warnings that the Australian bushfire season over the spring and summer period of 2019–2020 was going to be a significant danger, amid severe drought conditions.

In April 2019, a letter by 23 top fire and other emergency service officials warned the federal government that the coming fire season would be catastrophic. They called for a national summit to discuss preparations, which included increases in the number of firefighting aircraft. The government ignored the warning, and refused to provide the largely voluntary rural fire services with increases in fire-fighting equipment.

Firefighting services, as well as funding for public health and hospital services, have been run down by governments at the federal and state levels, both Liberal and Labor. All of these parties bear responsibility for the tragic loss of life and broader health problems caused the latest bushfires as well as the devastation of agricultural land, bushland and rural communities.



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